



Australian Government

Department of Education, Employment and Workplace Relations

MSATCM403A Evaluate mould design and gating

Revision Number: 1

MSATCM403A Evaluate mould design and gating

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor	This unit covers the knowledge and skills needed to evaluate mould design, gating, running and feeding of castings (known as methoding) including understanding the solidification process and techniques to eliminate defects to meet specified quality requirements.
------------------------	--

Application of the Unit

Application of the unit	In a typical scenario, a metallurgical technician will be required to examine a mould design and draw some conclusions as to the appropriateness of gating, running and feeding design, or alternatively make some recommendations as to design.
--------------------------------	--

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Pre-requisite Units	MSATCM304A	<i>Interpret basic binary phase diagrams</i>
	MSATCM305A	<i>Demonstrate basic knowledge of casting operations</i>

Employability Skills Information

Employability Skills	This unit contains employability skills.
-----------------------------	--

Elements and Performance Criteria Pre-Content

Not applicable.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Identify specification requirements for required casting	1.1. Obtain all relevant job requirements and design specifications in accordance with workplace procedures 1.2. Identify and interpret drawing requirements and specifications
2. Evaluate proposed mould design for causes of potential defects	2.1. Select running, gating and feeding principles and techniques relevant to the particular casting 2.2. Apply relevant scientific principles and techniques appropriately 2.3. Review placement and sizing of feeder heads 2.4. Calculate the size and number of feeder heads and gating for castings
3. Report results	3.1. Identify reporting requirements 3.2. Prepare report to meet requirements 3.3. Circulate and file report to procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required skills:

- Apply scientific principles to foundry mould design
- Evaluate mould design to suit specific applications
- Calculate mould runner and feeding systems
- Select appropriate techniques and associated software and hardware technologies to suit specific applications in foundry mould design
- Present solutions and any associated limitations referring to the original aim of the application.

Required knowledge:

- Solidification
 - Nucleation
 - Growth mechanisms (crystal and interfacial)
 - Dendrite coherency
 - Constitutional undercooling
 - Superheat
 - Eutectic and peritectic solidification
 - Grain Structure
- Running, Gating and Feeding
 - Terminology
 - Runner and gating principles (ratios)
 - Pouring basin or cup
 - Sprue design
 - Runner design
 - Ingate design
 - Inclusion control (slag, erosion, etc)
 - Metal flow (lamellar and turbulent), velocity and temperature
 - Modulus principle (calculation of feeder size)
 - Location of feeders (end and feed zones, neighbourhood effect, feeding distances)
 - Exothermic and insulating feeding aids (sleeves and topping)
 - Feeding mechanisms (liquid, mass, interdendritic, burst&solid)
 - Computer packages (runner and feeder calculations, mould simulations)
 - Yield calculations
- Defect Formation
 - Shrinkage

REQUIRED SKILLS AND KNOWLEDGE

- Porosity
- Segregation
- Hot Tearing
- Shear

Evidence Guide

EVIDENCE GUIDE

The Evidence Guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment Guidelines for the Training Package.

Overview of assessment

A person who demonstrates competency in this unit must be able to evaluate mould design and gating. Critical aspects for assessment and evidence are required to demonstrate competency in this unit.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

It is essential that competence is demonstrated in the ability to:

- Calculate manually and by use of computer programs runner and feeding systems for casting designs. Evidence must be provided of manual calculations and compared to computer program results.
- Evaluate mould designs. Evidence should be provided from the evaluation of a number of moulds.
- Understand the interplay between moulds, cores, gating and feeding
- Evaluate the resulting casting for success of gating and feeding
- Compare casting results with computer simulated predictions.

Relationship to other units

This unit may be assessed concurrently with other relevant units.

Assessment method and context

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

EVIDENCE GUIDE**Resource implications**

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the commencement of assessment.

This section should be read in conjunction with the range of variables for this unit of competency. Resources required include suitable access to an operating plant or equipment that allows for appropriate and realistic simulation. A bank of case studies/scenarios and questions will also be required to the extent that they form part of the assessment method. Questioning may take place either in the workplace, or in an adjacent, quiet facility such as an office or lunchroom. No other special resources are required.

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Codes of practice/standards	Where reference is made to industry codes of practice, and/or Australian/international standards, it is expected the latest version will be used.
Size and number of feeder heads and gating	Calculation of the size of feeder heads and gating includes manual calculation and use of computer programs

Unit Sector(s)

Unit Sector	Metallurgy
--------------------	------------

Competency field

Competency Field	
-------------------------	--

Co-requisite units

Co-requisite Units		